Ref. No.: 12439-0167

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	10/815,400	Conf. No.:	7966
Applicant	:	Eldridge et al.		
Filed	:	March 31, 2004		
TC/A.U.	:	2829		
Examiner	:	Ernest F. Karlsen		
Docket No.	:	P71C2-US		

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION UNDER 37 CFR § 1.132 OF GAETAN L. MATHIEU

I, Gaetan L. Mathieu, declare as follows:

1. I am one of the named inventors of the above-identified patent application.

2. I hold a bachelor of science degree in mechanical engineering from Sherbrooke University in Quebec, Canada. I have worked for FormFactor, Inc. (the assignee of the above-identified patent application) since its founding in 1993. At FormFactor, I have held a variety of positions, including vice president level positions since about 1994. I am currently Vice President of Special Projects and an Engineering Fellow at FormFactor. I have held my current positions at FormFactor for about four years.

3. I have studied US Patent Application Serial No. 10/815,400 (hereinafter the '400 application) and am familiar with products made by FormFactor, Inc. that utilize the blade technology disclosed in the '400 application. Figure 2A (as amended on June 6, 2006) of the '400 application shows a terminal 44 being forced against the cutting edge of a blade 22 configured as the tip structure 20 of a spring contact element 24. As shown in Figure 2C (as amended on June 6, 2006) of the '400 application, as the terminal 44 is pressed toward the blade 22 past first contact with the blade 22, the blade 22 wipes across the terminal 44. As also shown in Figure 2C (as amended on June 6, 2006), the tip structure 20—and thus the blade 22—also

rotates with respect to the terminals 44, which results in a back face of the blade 22 being pressed into the terminal 44 at the end of the wiping motion. The back face of the blade 22 is the face of the blade 22 in Figure 2C at which the line extending from the number 22 ends.

4. Attached as Ex. A is a photograph of an example of a spring contact structure with an example of a blade tip structure, and attached as Exs. B and C are annotated photographs of a slice mark made by a blade of the type pictured in Ex. A on a lead-tin bump terminal such as is commonly used on certain types of semiconductor dies. The photographs in Exs. A, B, and C are magnified. The length of the blade in Ex. A is approximately 50 microns, and the length of the slice mark in Exs. B and C is approximately 60 microns. In Ex. B, the slice mark is encircled and identified as a "slice mark," and the direction of the wipe of the blade that made the slice mark is indicated. Ex. C shows the same photograph as Ex. B, but the photograph in Ex. C is annotated to identify parts of the slice mark as a heel portion and an elongate portion.

5. As can be seen in Exs. B and C, the slice mark has a heel portion at the bottom in the photograph of Exs. B and C (labeled "heel portion of mark") and an elongate portion that extends generally upward in the photograph of Exs. B and C (labeled "elongate portion of mark") away from the heel portion. The elongate portion is created as the blade contacts and wipes across the terminal. The heel portion is created as a back surface (labeled "back surface" in Exhibit A) of the blade presses against the terminal as the blade rotates due to the terminal being pressed against the blade past first contact with the blade.

6. I have studied US Patent No. 5,883,519 to Kennedy (hereinafter "the Kennedy patent"). The Kennedy patent employs a technique for establishing an electrical connection with terminals of a semiconductor die that is significantly different than the technique of a slicing blade disclosed in the '400 application. As shown in Figures 3 and 6 of the Kennedy patent, Kennedy utilizes a deflection device 37 to first raise a probe tip 30 (e.g., into position 51 in Figure 3 or 51a in Figure 6) and then slam the probe tip 30 like a hammer down onto the surface of a terminal of a die 13. The Kennedy patent specifies that the tip 30 must have "substantial velocity and therefore a high kinetic energy" as the tip 30 impacts the terminal. (The Kennedy patent col. 5, lines 11 and 12; see also col. 6, lines 30-37.) As discussed below, in my opinion, the hammer action disclosed in Kennedy cannot create a slice mark with a heel portion and an elongate portion extending from the heel portion like the example of a slice mark shown in Exs. B and C.

7. More specifically, in my opinion, the hammer action of the Kennedy patent will cause the contact tip that extends from the bottom of Kennedy's blade 71 to create a puncture mark in the terminal of the chip 13 (see Figures 5 and 6 of Kennedy). Moreover, this puncture mark will penetrate the surface of the terminal of the chip 13 and extend into the terminal of the chip 13 in a direction that is substantially perpendicular with respect to the surface or a portion of the surface of the terminal struck by the contact tip of the blade 71. Kennedy shows the surface of the terminal that is struck by the contact tip of a blade 71 as being approximately parallel with the surface of the die 13 on which the terminal is located. More specifically, this puncture mark will be created as the contact tip that extends from the bottom of the blade 71 impacts the terminal of the chip 13. It is my opinion that the system disclosed in Kennedy is configured so that, at the time the contact tip that extends from the bottom of the blade 71 impacts the terminal of the chip 13, the contact tip is moving in a direction that is substantially perpendicular to the surface of the terminal (and thus the surface of the chip 13 on which the terminal is located). I would therefore expect the puncture mark in the terminal of the chip 13 to be substantially perpendicular to the surface of the terminal and the surface of the chip 13 on which the terminal is located. I would thus expect the puncture mark in a terminal of the chip 13 to be essentially a hole that extends into the terminal of the chip 13 in a direction that is substantially perpendicular to the surface of the terminal struck by Kennedy's probe and the surface of the chip 13 on which the terminal is located.

8. For the reasons discussed above, in my opinion, the marks created by the blades of the '400 application on each of the terminals of the dies will be slice marks that are shaped generally as shown in Exs. B and C and oriented generally parallel to the surface or the portion of the surface of the terminal contacted by a blade, which is often approximately parallel to the surface of the die on which the terminals are located. The slice marks on the terminals will thus be generally parallel to the terminals and have a blade-shaped elongate portion that extends from a heel portion as shown in Ex. B and C. In contrast, the mark created by the contact tip that extends from the bottom of one of Kennedy's blades 71 on a terminal of the chip 13 will be a simple puncture mark (i.e., a hole) that is oriented substantially perpendicular to the surface of the terminal struck by Kennedy's probe. The marks made on the terminals of Kennedy's chip 13 are thus puncture marks that extend substantially perpendicular into the terminals of the chip 13.

9. I am familiar with and know about different types of probes for contacting terminals of semiconductor dies commonly in use on or before November 10, 1998 (the priority date of the '400 application). One common type of probe in use at that time was a buckling beam probe. US Patent No. 3,806,801 (the '801 patent) illustrates buckling beam probes, which are shown in the '801 patent as probes 15 in Figure 1. Buckling beam probes were typically long and thin and designed to buckle along their length in response to being pressed against terminals of a semiconductor die. (See, e.g., the '801 patent col. 1, lines 45-54.) In use, buckling beam probes were typically pressed against terminals of a semiconductor dies and typically created on the terminals puncture marks that extended vertically into the terminals. In my opinion, the puncture marks made by buckling beam probes on the terminals of a semiconductor die are generally speaking similar to the puncture marks I would expect the Kennedy patent to make on semiconductor die terminals. Such a puncture mark is essentially a hole that extends part way into the terminal. In the case of Kennedy the puncture mark will be made by an impact rater then by a force. But essentially it will be a straight down puncture similar to one done by a buckling beam. Such puncture marks—or holes—in the terminal do not have a heel portion, created by a scrubbing action, with a blade-shaped elongate portion extending from the heel portion as illustrated in Exs. B and C. The scrub marks shown in Exs. B and C are thus very different than puncture marks made in the terminals of a semiconductor die by buckling beam probes or impact action.

10. In my experience, the native aluminum oxide that typically forms on aluminum terminals on some types of semiconductor dies is typically extremely thin. It is typically between 10 and 30 angstroms thick.

11. All statements herein made of my own knowledge are true and all statements made on information and belief are believed to be true. I acknowledge that willful false statements and the like are punishable by fine or imprisonment, or both (18 USC § 1001) and may jeopardize the validity of the above-identified application or any patent issuing thereon.

Respectfully submitted,

Date: June 01, 2009

Gaetan L. Mathieu

EXHIBIT A

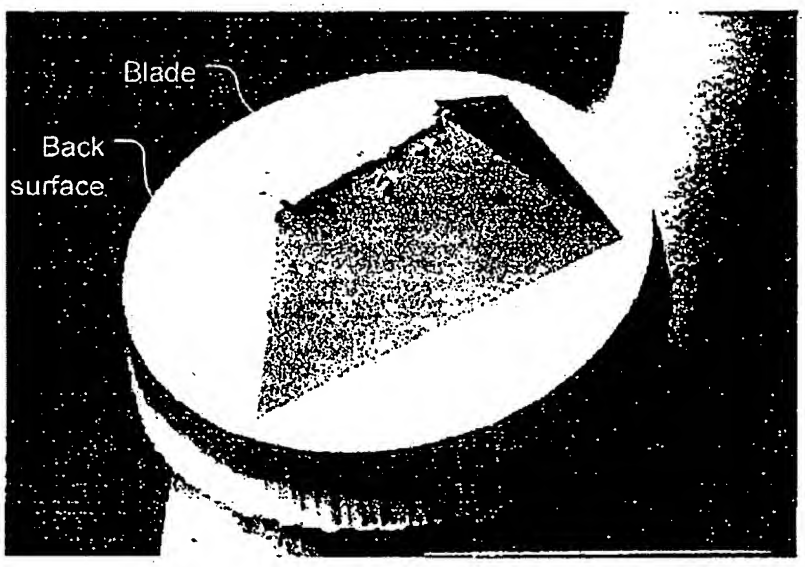

EXHIBIT B

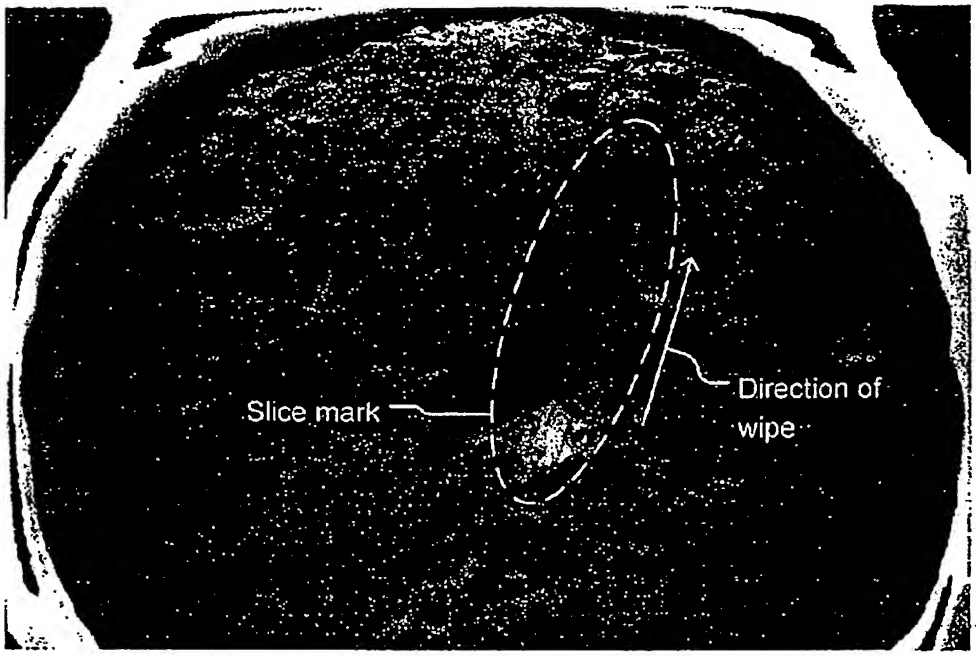

EXHIBIT C

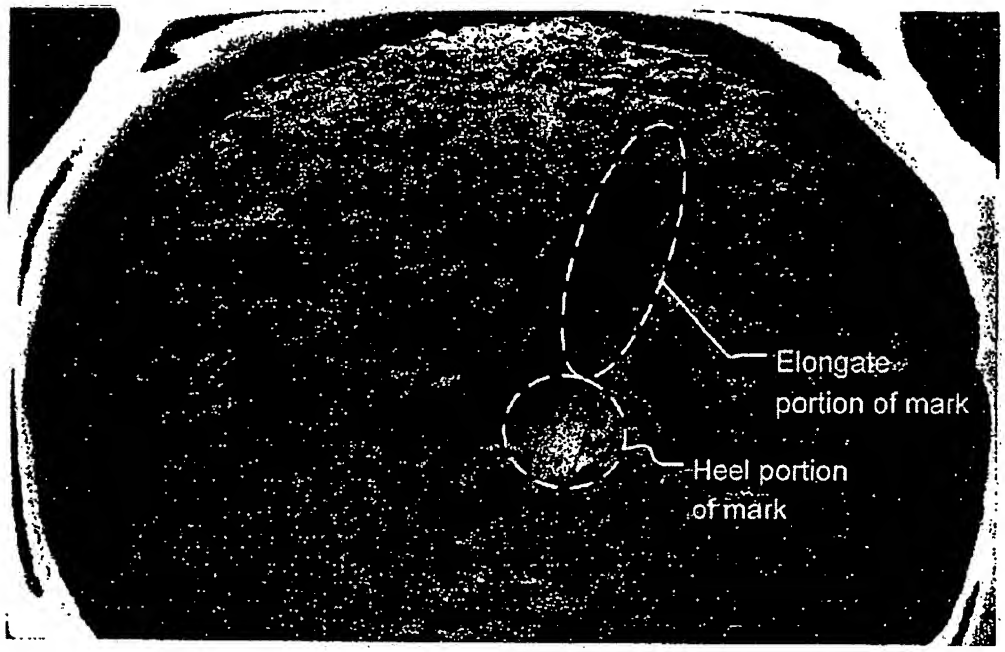

EXHIBIT A

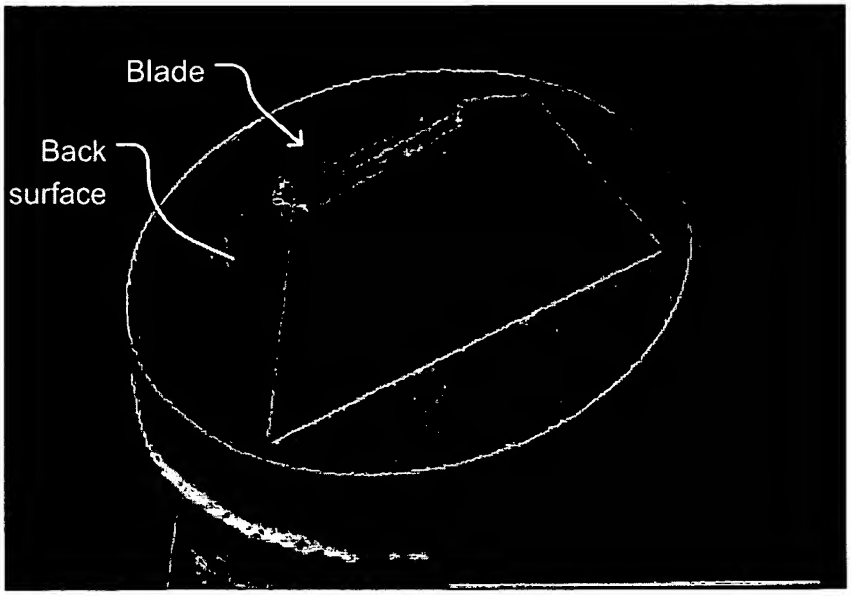

EXHIBIT B

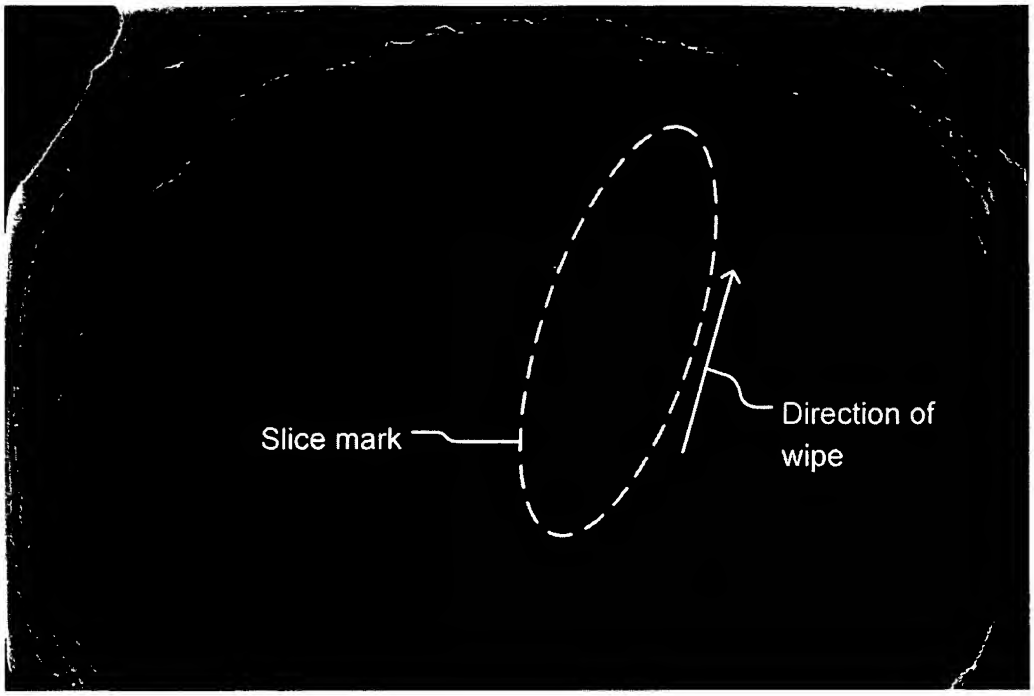

EXHIBIT C